

CHARMED BARYONS ($C = +1$)

$$\begin{aligned}\Lambda_c^+ &= u d c, \quad \Sigma_c^{++} = u u c, \quad \Sigma_c^+ = u d c, \quad \Sigma_c^0 = d d c, \\ \Xi_c^+ &= u s c, \quad \Xi_c^0 = d s c, \quad \Omega_c^0 = s s c\end{aligned}$$

Λ_c^+

$$I(J^P) = 0(\frac{1}{2}^+)$$

J is not well measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2286.46 \pm 0.14$ MeV

Mean life $\tau = (200 \pm 6) \times 10^{-15}$ s ($S = 1.6$)

$c\tau = 59.9 \mu\text{m}$

Decay asymmetry parameters

$$\Lambda\pi^+ \quad \alpha = -0.91 \pm 0.15$$

$$\Sigma^+\pi^0 \quad \alpha = -0.45 \pm 0.32$$

$$\Lambda\ell^+\nu_\ell \quad \alpha = -0.86 \pm 0.04$$

$$(\alpha + \bar{\alpha})/(\alpha - \bar{\alpha}) \text{ in } \Lambda_c^+ \rightarrow \Lambda\pi^+, \bar{\Lambda}_c^- \rightarrow \bar{\Lambda}\pi^- = -0.07 \pm 0.31$$

$$(\alpha + \bar{\alpha})/(\alpha - \bar{\alpha}) \text{ in } \Lambda_c^+ \rightarrow \Lambda e^+\nu_e, \bar{\Lambda}_c^- \rightarrow \bar{\Lambda}e^-\bar{\nu}_e = 0.00 \pm 0.04$$

Nearly all branching fractions of the Λ_c^+ are measured relative to the $pK^-\pi^+$ mode, but there are no model-independent measurements of this branching fraction. We explain how we arrive at our value of $B(\Lambda_c^+ \rightarrow pK^-\pi^+)$ in a Note at the beginning of the branching-ratio measurements in the Listings. When this branching fraction is eventually well determined, all the other branching fractions will slide up or down proportionally as the true value differs from the value we use here.

Λ_c^+ DECAY MODES	Fraction (Γ_i/Γ)	Scale factor/ Confidence level	p (MeV/c)
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Hadronic modes with a p : $S = -1$ final states

$p\bar{K}^0$	(2.3 \pm 0.6) %	873	
$pK^-\pi^+$	[a] (5.0 \pm 1.3) %	823	
$p\bar{K}^*(892)^0$	[b] (1.6 \pm 0.5) %	685	
$\Delta(1232)^{++}K^-$	(8.6 \pm 3.0) $\times 10^{-3}$	710	
$\Lambda(1520)\pi^+$	[b] (1.8 \pm 0.6) %	627	
$pK^-\pi^+$ nonresonant	(2.8 \pm 0.8) %	823	
$p\bar{K}^0\pi^0$	(3.3 \pm 1.0) %	823	
$p\bar{K}^0\eta$	(1.2 \pm 0.4) %	568	
$p\bar{K}^0\pi^+\pi^-$	(2.6 \pm 0.7) %	754	
$pK^-\pi^+\pi^0$	(3.4 \pm 1.0) %	759	
$pK^*(892)^-\pi^+$	[b] (1.1 \pm 0.5) %	580	
$p(K^-\pi^+)_{\text{nonresonant}}\pi^0$	(3.6 \pm 1.2) %	759	
$\Delta(1232)\bar{K}^*(892)$	seen	419	
$pK^-\pi^+\pi^+\pi^-$	(1.1 \pm 0.8) $\times 10^{-3}$	671	
$pK^-\pi^+\pi^0\pi^0$	(8 \pm 4) $\times 10^{-3}$	678	

Hadronic modes with a p : $S = 0$ final states

$p\pi^+\pi^-$	(3.5 \pm 2.0) $\times 10^{-3}$	927	
$p f_0(980)$	[b] (2.8 \pm 1.9) $\times 10^{-3}$	614	
$p\pi^+\pi^+\pi^-\pi^-$	(1.8 \pm 1.2) $\times 10^{-3}$	852	
pK^+K^-	(7.7 \pm 3.5) $\times 10^{-4}$	616	
$p\phi$	[b] (8.2 \pm 2.7) $\times 10^{-4}$	590	
pK^+K^- non- ϕ	(3.5 \pm 1.7) $\times 10^{-4}$	616	

NODE=BXXX040

NODE=S033

NODE=S033M;DTYPE=M

NODE=S033T;DTYPE=T

NODE=S033CTA;DTYPE=C;OUR EVAL

CLUMP=D

NODE=S033A;DTYPE=d;CLUMP=D

NODE=S033ALS;DTYPE=d;CLUMP=D

NODE=S033ALC;DTYPE=d;CLUMP=D

NODE=S033AC1;DTYPE=d;CLUMP=D

NODE=S033ACP;DTYPE=d;CLUMP=D

NODE=S033215;NODE=S033

NODE=S033;CLUMP=A

DESIG=3

DESIG=4

DESIG=5

DESIG=6

DESIG=38

DESIG=39

DESIG=69

DESIG=62

DESIG=7

DESIG=18

DESIG=8

DESIG=40

DESIG=19

DESIG=23

DESIG=41

NODE=S033;CLUMP=D

DESIG=30

DESIG=31

DESIG=32

DESIG=33

DESIG=34

DESIG=70

Hadronic modes with a hyperon: $S = -1$ final states

$\Lambda\pi^+$	(1.07 ± 0.28) %	864	NODE=S033;CLUMP=B
$\Lambda\pi^+\pi^0$	(3.6 ± 1.3) %	844	DESIG=49
$\Lambda\rho^+$	< 5 %	CL=95%	636
$\Lambda\pi^+\pi^+\pi^-$	(2.6 ± 0.7) %	807	DESIG=1
$\Sigma(1385)^+\pi^+\pi^-$, $\Sigma^{*+} \rightarrow$	(7 ± 4) $\times 10^{-3}$	688	DESIG=100
$\Lambda\pi^+$	(5.5 ± 1.7) $\times 10^{-3}$	688	DESIG=101
$\Lambda\pi^-$			
$\Lambda\pi^+\rho^0$	(1.1 ± 0.5) %	524	DESIG=102
$\Sigma(1385)^+\rho^0$, $\Sigma^{*+} \rightarrow \Lambda\pi^+$	(3.7 ± 3.1) $\times 10^{-3}$	363	DESIG=103
$\Lambda\pi^+\pi^+\pi^-$ nonresonant	< 8 $\times 10^{-3}$	CL=90%	807
$\Lambda\pi^+\pi^+\pi^-\pi^0$ total	(1.8 ± 0.8) %	757	DESIG=79
$\Lambda\pi^+\eta$	[b] (1.8 ± 0.6) %	691	DESIG=63
$\Sigma(1385)^+\eta$	[b] (8.5 ± 3.3) $\times 10^{-3}$	570	DESIG=64
$\Lambda\pi^+\omega$	[b] (1.2 ± 0.5) %	517	DESIG=81
$\Lambda\pi^+\pi^+\pi^-\pi^0$, no η or ω	< 7 $\times 10^{-3}$	CL=90%	757
$\Lambda K^+\bar{K}^0$	(4.7 ± 1.5) $\times 10^{-3}$	S=1.2	443
$\Xi(1690)^0 K^+$, $\Xi^{*0} \rightarrow \Lambda\bar{K}^0$	(1.3 ± 0.5) $\times 10^{-3}$	286	DESIG=65
$\Sigma^0\pi^+$	(1.05 ± 0.28) %	825	DESIG=10
$\Sigma^+\pi^0$	(1.00 ± 0.34) %	827	DESIG=9
$\Sigma^+\eta$	(5.5 ± 2.3) $\times 10^{-3}$	713	DESIG=66
$\Sigma^+\pi^+\pi^-$	(3.6 ± 1.0) %	804	DESIG=21
$\Sigma^+\rho^0$	< 1.4 %	CL=95%	575
$\Sigma^-\pi^+\pi^+$	(1.7 ± 0.5) %	799	DESIG=59
$\Sigma^0\pi^+\pi^0$	(1.8 ± 0.8) %	803	DESIG=50
$\Sigma^0\pi^+\pi^+\pi^-$	(8.3 ± 3.1) $\times 10^{-3}$	763	DESIG=51
$\Sigma^+\pi^+\pi^-\pi^0$	—	767	DESIG=48;OUR EVAL;→ UNCHECKED ←
$\Sigma^+\omega$	[b] (2.7 ± 1.0) %	569	DESIG=47
$\Sigma^+K^+K^-$	(2.8 ± 0.8) $\times 10^{-3}$	349	DESIG=35
$\Sigma^+\phi$	[b] (3.1 ± 0.9) $\times 10^{-3}$	295	DESIG=43
$\Xi(1690)^0 K^+$, $\Xi^{*0} \rightarrow$	(8.1 ± 3.0) $\times 10^{-4}$	286	DESIG=75
Σ^+K^-			
$\Sigma^+K^+K^-$ nonresonant	< 6 $\times 10^{-4}$	CL=90%	349
$\Xi^0 K^+$	(3.9 ± 1.4) $\times 10^{-3}$	653	DESIG=44
$\Xi^- K^+\pi^+$	(5.1 ± 1.4) $\times 10^{-3}$	565	DESIG=27
$\Xi(1530)^0 K^+$	[b] (2.6 ± 1.0) $\times 10^{-3}$	473	DESIG=45

Hadronic modes with a hyperon: $S = 0$ final states

ΛK^+	(5.0 ± 1.6) $\times 10^{-4}$	781	NODE=S033;CLUMP=G
$\Lambda K^+\pi^+\pi^-$	< 4 $\times 10^{-4}$	CL=90%	637
$\Sigma^0 K^+$	(4.2 ± 1.3) $\times 10^{-4}$	735	DESIG=74
$\Sigma^0 K^+\pi^+\pi^-$	< 2.1 $\times 10^{-4}$	CL=90%	574
$\Sigma^+ K^+\pi^-$	(1.7 ± 0.7) $\times 10^{-3}$	670	DESIG=36
$\Sigma^+ K^*(892)^0$	[b] (2.8 ± 1.1) $\times 10^{-3}$	470	DESIG=77
$\Sigma^- K^+\pi^+$	< 1.0 $\times 10^{-3}$	CL=90%	664
			DESIG=78

Doubly Cabibbo-suppressed modes

$p K^+\pi^-$	< 2.3 $\times 10^{-4}$	CL=90%	823	NODE=S033;CLUMP=H
				DESIG=105

Semileptonic modes

$\Lambda\ell^+\nu_\ell$	[c] (2.0 ± 0.6) %	871	NODE=S033;CLUMP=E
$\Lambda e^+\nu_e$	(2.1 ± 0.6) %	871	DESIG=67
$\Lambda\mu^+\nu_\mu$	(2.0 ± 0.7) %	867	DESIG=68

Inclusive modes

e^+ anything	(4.5 ± 1.7) %	—	DESIG=12
$p e^+$ anything	(1.8 ± 0.9) %	—	DESIG=13
p anything	(50 ± 16) %	—	DESIG=53
p anything (no Λ)	(12 ± 19) %	—	DESIG=54
n anything	(50 ± 16) %	—	DESIG=55
n anything (no Λ)	(29 ± 17) %	—	DESIG=56
Λ anything	(35 ± 11) %	S=1.4	—
Σ^\pm anything	[d] (10 ± 5) %	—	DESIG=17
3prongs	(24 ± 8) %	—	DESIG=82

**$\Delta C = 1$ weak neutral current (*C1*) modes, or
Lepton Family number (*LF*), or Lepton number (*L*), or
Baryon number (*B*) violating modes**

NODE=S033;CLUMP=F

$p e^+ e^-$	<i>C1</i>	< 5.5	$\times 10^{-6}$	CL=90%	951	DESIG=108
$p \mu^+ \mu^-$	<i>C1</i>	< 4.4	$\times 10^{-5}$	CL=90%	937	DESIG=60
$p e^+ \mu^-$	<i>LF</i>	< 9.9	$\times 10^{-6}$	CL=90%	947	DESIG=109
$p e^- \mu^+$	<i>LF</i>	< 1.9	$\times 10^{-5}$	CL=90%	947	DESIG=110
$\bar{p} 2e^+$	<i>L,B</i>	< 2.7	$\times 10^{-6}$	CL=90%	951	DESIG=111
$\bar{p} 2\mu^+$	<i>L,B</i>	< 9.4	$\times 10^{-6}$	CL=90%	937	DESIG=112
$\bar{p} e^+ \mu^+$	<i>L,B</i>	< 1.6	$\times 10^{-5}$	CL=90%	947	DESIG=113
$\Sigma^- \mu^+ \mu^+$	<i>L</i>	< 7.0	$\times 10^{-4}$	CL=90%	812	DESIG=61

 $\Lambda_c(2595)^+$

$I(J^P) = 0(\frac{1}{2}^-)$

NODE=B119

The spin-parity follows from the fact that $\Sigma_c(2455)\pi$ decays, with little available phase space, are dominant. This assumes that $J^P = 1/2^+$ for the $\Sigma_c(2455)$.

Mass $m = 2592.25 \pm 0.28$ MeV

NODE=B119M;DTYPE=M

 $m - m_{\Lambda_c^+} = 305.79 \pm 0.24$ MeV

NODE=B119D;DTYPE=D

Full width $\Gamma = 2.6 \pm 0.6$ MeV

NODE=B119W;DTYPE=G

$\Lambda_c^+\pi\pi$ and its submode $\Sigma_c(2455)\pi$ — the latter just barely — are the only strong decays allowed to an excited Λ_c^+ having this mass; and the submode seems to dominate.

NODE=B119215;NODE=B119

$\Lambda_c(2595)^+$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)	
$\Lambda_c^+\pi^+\pi^-$	[e] ≈ 67 %	117	DESIG=1;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma_c(2455)^{++}\pi^-$	24 ± 7 %	†	DESIG=2;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma_c(2455)^0\pi^+$	24 ± 7 %	†	DESIG=3;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Lambda_c^+\pi^+\pi^-$ 3-body	18 ± 10 %	117	DESIG=6;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Lambda_c^+\pi^0$	[f] not seen	258	DESIG=4;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Lambda_c^+\gamma$	not seen	288	DESIG=5;OUR EST; \rightarrow UNCHECKED \leftarrow

 $\Lambda_c(2625)^+$

$I(J^P) = 0(\frac{3}{2}^-)$

NODE=B102

 J^P has not been measured; $\frac{3}{2}^-$ is the quark-model prediction.Mass $m = 2628.11 \pm 0.19$ MeV ($S = 1.1$)

NODE=B102M;DTYPE=M

 $m - m_{\Lambda_c^+} = 341.65 \pm 0.13$ MeV ($S = 1.1$)

NODE=B102D;DTYPE=D

Full width $\Gamma < 0.97$ MeV, CL = 90%

NODE=B102W;DTYPE=G

$\Lambda_c^+ \pi\pi$ and its submode $\Sigma(2455)\pi$ are the only strong decays allowed to an excited Λ_c^+ having this mass.

NODE=B102215;NODE=B102

$\Lambda_c(2625)^+$ DECAY MODES		Fraction (Γ_i/Γ)	Confidence level	p (MeV/c)
$\Lambda_c^+ \pi^+ \pi^-$	[e]	$\approx 67\%$		184
$\Sigma_c(2455)^{++} \pi^-$		<5	90%	102
$\Sigma_c(2455)^0 \pi^+$		<5	90%	102
$\Lambda_c^+ \pi^+ \pi^-$ 3-body		large		184
$\Lambda_c^+ \pi^0$	[f]	not seen		293
$\Lambda_c^+ \gamma$		not seen		319

 $\Lambda_c(2880)^+$

$$I(J^P) = 0(\frac{5}{2}^+)$$

There is some good evidence that indeed $J^P = 5/2^+$

Mass $m = 2881.53 \pm 0.35$ MeV

$m - m_{\Lambda_c^+} = 595.1 \pm 0.4$ MeV

Full width $\Gamma = 5.8 \pm 1.1$ MeV

DESIG=1;OUR EST; \rightarrow UNCHECKED ←
 DESIG=2;OUR EST; \rightarrow UNCHECKED ←
 DESIG=4;OUR EST; \rightarrow UNCHECKED ←
 DESIG=3;OUR EST; \rightarrow UNCHECKED ←
 DESIG=5;OUR EST; \rightarrow UNCHECKED ←
 DESIG=6;OUR EST; \rightarrow UNCHECKED ←

$\Lambda_c(2880)^+$ DECAY MODES		Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \pi^+ \pi^-$		seen	471
$\Sigma_c(2455)^0, ++ \pi^\pm$		seen	376
$\Sigma_c(2520)^0, ++ \pi^\pm$		seen	317
$p D^0$		seen	316

 $\Lambda_c(2940)^+$

$$I(J^P) = 0(?)$$

Mass $m = 2939.3^{+1.4}_{-1.5}$ MeV

Full width $\Gamma = 17^{+8}_{-6}$ MeV

NODE=B151220;DESIG=1;OUR EST
 DESIG=2;OUR EST
 DESIG=3;OUR EST
 DESIG=4;OUR EST

$\Lambda_c(2940)^+$ DECAY MODES		Fraction (Γ_i/Γ)	p (MeV/c)
$p D^0$		seen	420
$\Sigma_c(2455)^0, ++ \pi^\pm$		seen	—

NODE=B122

NODE=B122M;DTYPE=M
 NODE=B122W;DTYPE=G

NODE=B122220;DESIG=1;OUR EST
 DESIG=2;OUR EST

 $\Sigma_c(2455)$

$$I(J^P) = 1(\frac{1}{2}^+)$$

$\Sigma_c(2455)^{++}$ mass $m = 2453.98 \pm 0.16$ MeV

$\Sigma_c(2455)^+$ mass $m = 2452.9 \pm 0.4$ MeV

$\Sigma_c(2455)^0$ mass $m = 2453.74 \pm 0.16$ MeV

$m_{\Sigma_c^{++}} - m_{\Lambda_c^+} = 167.52 \pm 0.08$ MeV

$m_{\Sigma_c^+} - m_{\Lambda_c^+} = 166.4 \pm 0.4$ MeV

$m_{\Sigma_c^0} - m_{\Lambda_c^+} = 167.27 \pm 0.08$ MeV

$m_{\Sigma_c^{++}} - m_{\Sigma_c^0} = 0.24 \pm 0.09$ MeV (S = 1.1)

$m_{\Sigma_c^+} - m_{\Sigma_c^0} = -0.9 \pm 0.4$ MeV

$\Sigma_c(2455)^{++}$ full width $\Gamma = 2.26 \pm 0.25$ MeV

$\Sigma_c(2455)^+$ full width $\Gamma < 4.6$ MeV, CL = 90%

$\Sigma_c(2455)^0$ full width $\Gamma = 2.16 \pm 0.26$ MeV (S = 1.1)

NODE=B104

NODE=B104M++;DTYPE=M
 NODE=B104M+;DTYPE=M
 NODE=B104M0;DTYPE=M
 NODE=B104D++;DTYPE=D
 NODE=B104D+;DTYPE=D
 NODE=B104D0;DTYPE=D
 NODE=B104D13;DTYPE=D
 NODE=B104D14;DTYPE=D
 NODE=B104W++;DTYPE=G
 NODE=B104W+;DTYPE=G
 NODE=B104W0;DTYPE=G

$\Lambda_c^+ \pi$ is the only strong decay allowed to a Σ_c having this mass.

NODE=B104215;NODE=B104

$\Sigma_c(2455)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \pi$	$\approx 100\%$	94

DESIG=1;OUR EST; \rightarrow UNCHECKED \leftarrow

$\Sigma_c(2520)$

$$I(J^P) = 1(\frac{3}{2}^+)$$

J^P has not been measured; $\frac{3}{2}^+$ is the quark-model prediction.

$\Sigma_c(2520)^{++}$ mass $m = 2517.9 \pm 0.6$ MeV (S = 1.6)

$\Sigma_c(2520)^+$ mass $m = 2517.5 \pm 2.3$ MeV

$\Sigma_c(2520)^0$ mass $m = 2518.8 \pm 0.6$ MeV (S = 1.5)

$m_{\Sigma_c(2520)^{++}} - m_{\Lambda_c^+} = 231.4 \pm 0.6$ MeV (S = 1.6)

$m_{\Sigma_c(2520)^+} - m_{\Lambda_c^+} = 231.0 \pm 2.3$ MeV

$m_{\Sigma_c(2520)^0} - m_{\Lambda_c^+} = 232.3 \pm 0.5$ MeV (S = 1.6)

$m_{\Sigma_c(2520)^{++}} - m_{\Sigma_c(2520)^0}$

$\Sigma_c(2520)^{++}$ full width $\Gamma = 14.9 \pm 1.5$ MeV

$\Sigma_c(2520)^+$ full width $\Gamma < 17$ MeV, CL = 90%

$\Sigma_c(2520)^0$ full width $\Gamma = 14.5 \pm 1.5$ MeV

$\Lambda_c^+ \pi$ is the only strong decay allowed to a Σ_c having this mass.

NODE=B115

NODE=B115M++;DTYPE=M

NODE=B115M+;DTYPE=M

NODE=B115M0;DTYPE=M

NODE=B115D++;DTYPE=D

NODE=B115D+;DTYPE=D

NODE=B115D0;DTYPE=D

NODE=B115DI;DTYPE=D

NODE=B115W++;DTYPE=G

NODE=B115W+;DTYPE=G

NODE=B115W0;DTYPE=G

NODE=B115220;NODE=B115

$\Sigma_c(2520)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \pi$	$\approx 100\%$	179

DESIG=1;OUR EST; \rightarrow UNCHECKED \leftarrow

$\Sigma_c(2800)$

$$I(J^P) = 1(?^?)$$

$\Sigma_c(2800)^{++}$ mass $m = 2801^{+4}_{-6}$ MeV

$\Sigma_c(2800)^+$ mass $m = 2792^{+14}_{-5}$ MeV

$\Sigma_c(2800)^0$ mass $m = 2806^{+5}_{-7}$ MeV (S = 1.3)

$m_{\Sigma_c(2800)^{++}} - m_{\Lambda_c^+} = 514^{+4}_{-6}$ MeV

$m_{\Sigma_c(2800)^+} - m_{\Lambda_c^+} = 505^{+14}_{-5}$ MeV

$m_{\Sigma_c(2800)^0} - m_{\Lambda_c^+} = 519^{+5}_{-7}$ MeV (S = 1.3)

$\Sigma_c(2800)^{++}$ full width $\Gamma = 75^{+22}_{-17}$ MeV

$\Sigma_c(2800)^+$ full width $\Gamma = 62^{+60}_{-40}$ MeV

$\Sigma_c(2800)^0$ full width $\Gamma = 72^{+22}_{-15}$ MeV

NODE=B155

NODE=B155M++;DTYPE=M

NODE=B155M+;DTYPE=M

NODE=B155M0;DTYPE=M

NODE=B155D++;DTYPE=D

NODE=B155D+;DTYPE=D

NODE=B155D0;DTYPE=D

NODE=B155W++;DTYPE=G

NODE=B155W+;DTYPE=G

NODE=B155W0;DTYPE=G

$\Sigma_c(2800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \pi$	seen	443

NODE=B155220;DESIG=1;OUR EST

Ξ_c^+

$$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$$

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2467.8^{+0.4}_{-0.6}$ MeV

Mean life $\tau = (442 \pm 26) \times 10^{-15}$ s (S = 1.3)

$c\tau = 132 \mu\text{m}$

NODE=S045

NODE=S045M;DTYPE=M

NODE=S045T;DTYPE=T

NODE=S045CTA;DTYPE=C;OUR EVAL

Ξ_c^+ DECAY MODES	Fraction (Γ_i/Γ)	Confidence level	P (MeV/c)
No absolute branching fractions have been measured.			
The following are branching ratios relative to $\Xi^- 2\pi^+$.			
Cabibbo-favored ($S = -2$) decays			
$p 2K_S^0$	[g] 0.087 ± 0.022	767	DESIG=21;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Lambda K^0 \pi^+$	—	852	DESIG=15;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma(1385)^+ \bar{K}^0$	[b,g] 1.0 ± 0.5	746	DESIG=16;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Lambda K^- 2\pi^+$	[g] 0.323 ± 0.033	787	DESIG=1;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Lambda \bar{K}^*(892)^0 \pi^+$	[b,g] <0.2	90%	DESIG=8;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma(1385)^+ K^- \pi^+$	[b,g] <0.3	90%	DESIG=9;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma^+ K^- \pi^+$	[g] 0.94 ± 0.11	810	DESIG=4;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma^+ \bar{K}^*(892)^0$	[b,g] 0.81 ± 0.15	658	DESIG=6;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma^0 K^- 2\pi^+$	[g] 0.29 ± 0.16	735	DESIG=2;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Xi^0 \pi^+$	[g] 0.55 ± 0.16	877	DESIG=11;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Xi^- 2\pi^+$	[g] DEFINED AS 1	851	DESIG=3;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Xi(1530)^0 \pi^+$	[b,g] <0.1	90%	DESIG=10;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Xi^0 \pi^+ \pi^0$	[g] 2.34 ± 0.68	856	DESIG=7;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Xi^0 \pi^- 2\pi^+$	[g] 1.74 ± 0.50	818	DESIG=12;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Xi^0 e^+ \nu_e$	[g] 2.3 ± 0.7	884	DESIG=5;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Omega^- K^+ \pi^+$	[g] 0.07 ± 0.04	399	DESIG=17;OUR EST; \rightarrow UNCHECKED \leftarrow
Cabibbo-suppressed decays			
$p K^- \pi^+$	[g] 0.21 ± 0.03	944	NODE=S045;CLUMP=B
$p \bar{K}^*(892)^0$	[b,g] 0.12 ± 0.02	828	DESIG=13;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma^+ \pi^+ \pi^-$	[g] 0.48 ± 0.20	922	DESIG=14;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma^- 2\pi^+$	[g] 0.18 ± 0.09	918	DESIG=22;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma^+ K^+ K^-$	[g] 0.15 ± 0.07	579	DESIG=23;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Sigma^+ \phi$	[b,g] <0.11	90%	DESIG=18;OUR EST; \rightarrow UNCHECKED \leftarrow
$\Xi(1690)^0 K^+, \Xi(1690)^0 \rightarrow \Sigma^+ K^-$	[g] <0.05	90%	DESIG=19;OUR EST; \rightarrow UNCHECKED \leftarrow
		501	DESIG=20;OUR EST; \rightarrow UNCHECKED \leftarrow

 Ξ_c^0

$$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$$

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2470.88^{+0.34}_{-0.80}$ MeV ($S = 1.1$)

$m_{\Xi_c^0} - m_{\Xi_c^+} = 3.1^{+0.4}_{-0.5}$ MeV

Mean life $\tau = (112^{+13}_{-10}) \times 10^{-15}$ s

$c\tau = 33.6 \mu\text{m}$

Decay asymmetry parameters

$$\Xi^- \pi^+ \quad \alpha = -0.6 \pm 0.4$$

NODE=S048

NODE=S048M;DTYPE=M

NODE=S048D;DTYPE=D

NODE=S048T;DTYPE=T

NODE=S048CTA;DTYPE=C;OUR EVAL

CLUMP=D

NODE=S048A;DTYPE=d;CLUMP=D

No absolute branching fractions have been measured. Several measurements of ratios of fractions may be found in the Listings that follow.

NODE=S048215;NODE=S048

Ξ_c^0 DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$p K^- K^- \pi^+$	seen	676
$p K^- \bar{K}^*(892)^0$	seen	413
$p K^- K^- \pi^+ \text{no } \bar{K}^*(892)^0$	seen	676
ΛK_S^0	seen	906
$\Lambda \bar{K}^0 \pi^+ \pi^-$	seen	787
$\Lambda K^- \pi^+ \pi^+ \pi^-$	seen	703
$\Xi^- \pi^+$	seen	875
$\Xi^- \pi^+ \pi^+ \pi^-$	seen	816
$\Omega^- K^+$	seen	522
$\Xi^- e^+ \nu_e$	seen	882
$\Xi^- \ell^+ \text{anything}$	seen	—

$\Xi_c^{'+}$

$$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$$

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2575.6 \pm 3.1$ MeV

$$m_{\Xi_c'^+} - m_{\Xi_c^+} = 107.8 \pm 3.0 \text{ MeV}$$

The $\Xi_c'^+ - \Xi_c^+$ mass difference is too small for any strong decay to occur.

DESIG=10;OUR EST;→ UNCHECKED ←
 DESIG=2;OUR EST;→ UNCHECKED ←
 DESIG=11;OUR EST;→ UNCHECKED ←
 DESIG=6;OUR EST;→ UNCHECKED ←
 DESIG=8
 DESIG=9
 DESIG=1;OUR EST;→ UNCHECKED ←
 DESIG=3;OUR EST;→ UNCHECKED ←
 DESIG=4;OUR EST;→ UNCHECKED ←
 DESIG=7;OUR EST;→ UNCHECKED ←
 DESIG=5;OUR EST;→ UNCHECKED ←

$\Xi_c^{'+}$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ \gamma$	seen	106

Ξ_c^0

$$I(J^P) = \frac{1}{2}(\frac{1}{2}^+)$$

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2577.9 \pm 2.9$ MeV

$$m_{\Xi_c'^0} - m_{\Xi_c^0} = 107.0 \pm 2.9 \text{ MeV}$$

The $\Xi_c'^0 - \Xi_c^0$ mass difference is too small for any strong decay to occur.

NODE=S058

NODE=S058M;DTYPE=M

NODE=S058D;DTYPE=D

NODE=S058215;NODE=S058

Ξ_c^0 DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^0 \gamma$	seen	105

$\Xi_c(2645)$

$$I(J^P) = \frac{1}{2}(\frac{3}{2}^+)$$

J^P has not been measured; $\frac{3}{2}^+$ is the quark-model prediction.

$\Xi_c(2645)^+$ mass $m = 2645.9^{+0.5}_{-0.6}$ MeV (S = 1.1)

$\Xi_c(2645)^0$ mass $m = 2645.9 \pm 0.5$ MeV

$$m_{\Xi_c(2645)^+} - m_{\Xi_c^0} = 175.0^{+0.8}_{-0.6} \text{ MeV} \quad (S = 1.2)$$

$$m_{\Xi_c(2645)^0} - m_{\Xi_c^+} = 178.1 \pm 0.6 \text{ MeV}$$

$$m_{\Xi_c(2645)^+} - m_{\Xi_c(2645)^0} = 0.0 \pm 0.5 \text{ MeV}$$

$\Xi_c(2645)^+$ full width $\Gamma < 3.1$ MeV, CL = 90%

$\Xi_c(2645)^0$ full width $\Gamma < 5.5$ MeV, CL = 90%

NODE=S059

NODE=S059M;DTYPE=M

NODE=S059D;DTYPE=D

NODE=S059215;NODE=S059

DESIG=1;OUR EST;→ UNCHECKED ←

NODE=B146

NODE=B146M+;DTYPE=M

NODE=B146M0;DTYPE=M

NODE=B146D+;DTYPE=D

NODE=B146D0;DTYPE=D

NODE=B146DD;DTYPE=D

NODE=B146W+;DTYPE=G

NODE=B146W0;DTYPE=G

$\Xi_c \pi$ is the only strong decay allowed to a Ξ_c resonance having this mass.

NODE=B146215;NODE=B146

$\Xi_c(2645)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^0 \pi^+$	seen	102
$\Xi_c^+ \pi^-$	seen	107

DESIG=2;OUR EST; \rightarrow UNCHECKED \leftarrow
DESIG=1;OUR EST; \rightarrow UNCHECKED \leftarrow

$\Xi_c(2790)$

$$I(J^P) = \frac{1}{2}(\frac{1}{2}^-)$$

J^P has not been measured; $\frac{1}{2}^-$ is the quark-model prediction.

$\Xi_c(2790)^+$ mass = 2789.1 ± 3.2 MeV
 $\Xi_c(2790)^0$ mass = 2791.8 ± 3.3 MeV
 $m_{\Xi_c(2790)^+} - m_{\Xi_c^0} = 318.2 \pm 3.2$ MeV
 $m_{\Xi_c(2790)^0} - m_{\Xi_c^+} = 324.0 \pm 3.3$ MeV
 $\Xi_c(2790)^+$ width $\Gamma < 15$ MeV, CL = 90%
 $\Xi_c(2790)^0$ width $\Gamma < 12$ MeV, CL = 90%

NODE=B149

NODE=B149M+;DTYPE=M
NODE=B149M0;DTYPE=M
NODE=B149D+;DTYPE=D
NODE=B149D0;DTYPE=D
NODE=B149W+;DTYPE=G
NODE=B149W0;DTYPE=G

$\Xi_c(2790)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c' \pi$	seen	159

NODE=B149215;DESIG=1;OUR EST

$\Xi_c(2815)$

$$I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$$

J^P has not been measured; $\frac{3}{2}^-$ is the quark-model prediction.

$\Xi_c(2815)^+$ mass $m = 2816.6 \pm 0.9$ MeV
 $\Xi_c(2815)^0$ mass $m = 2819.6 \pm 1.2$ MeV
 $m_{\Xi_c(2815)^+} - m_{\Xi_c^+} = 348.8 \pm 0.9$ MeV
 $m_{\Xi_c(2815)^0} - m_{\Xi_c^0} = 348.7 \pm 1.2$ MeV
 $m_{\Xi_c(2815)^+} - m_{\Xi_c(2815)^0} = -3.1 \pm 1.3$ MeV
 $\Xi_c(2815)^+$ full width $\Gamma < 3.5$ MeV, CL = 90%
 $\Xi_c(2815)^0$ full width $\Gamma < 6.5$ MeV, CL = 90%

NODE=B148

NODE=B148M+;DTYPE=M
NODE=B148M0;DTYPE=M
NODE=B148D+;DTYPE=D
NODE=B148D0;DTYPE=D
NODE=B148DD;DTYPE=D
NODE=B148W+;DTYPE=G
NODE=B148W0;DTYPE=G
NODE=B148215;NODE=B148

The $\Xi_c \pi \pi$ modes are consistent with being entirely via $\Xi_c(2645)\pi$.

$\Xi_c(2815)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Xi_c^+ \pi^+ \pi^-$	seen	196
$\Xi_c^0 \pi^+ \pi^-$	seen	191

DESIG=1;OUR EST
DESIG=2;OUR EST

$\Xi_c(2980)$

$$I(J^P) = \frac{1}{2}(?)$$

$\Xi_c(2980)^+$ $m = 2971.4 \pm 3.3$ MeV (S = 2.1)
 $\Xi_c(2980)^0$ $m = 2968.0 \pm 2.6$ MeV (S = 1.2)
 $\Xi_c(2980)^+$ width $\Gamma = 26 \pm 7$ MeV (S = 1.5)
 $\Xi_c(2980)^0$ width $\Gamma = 20 \pm 7$ MeV (S = 1.3)

NODE=B130

NODE=B130M+;DTYPE=M
NODE=B130M0;DTYPE=M
NODE=B130W+;DTYPE=G
NODE=B130W0;DTYPE=G

$\Xi_c(2980)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \bar{K} \pi$	seen	231
$\Sigma_c(2455) \bar{K}$	seen	134
$\Lambda_c^+ \bar{K}$	not seen	414
$\Xi_c 2\pi$	seen	—
$\Xi_c(2645) \pi$	seen	277

 $\Xi_c(3080)$

$I(J^P) = \frac{1}{2}(?^?)$

$\Xi_c(3080)^+$ $m = 3077.0 \pm 0.4$ MeV
 $\Xi_c(3080)^0$ $m = 3079.9 \pm 1.4$ MeV ($S = 1.3$)
 $\Xi_c(3080)^+$ width $\Gamma = 5.8 \pm 1.0$ MeV
 $\Xi_c(3080)^0$ width $\Gamma = 5.6 \pm 2.2$ MeV

$\Xi_c(3080)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Lambda_c^+ \bar{K} \pi$	seen	415
$\Sigma_c(2455) \bar{K}$	seen	342
$\Sigma_c(2455) \bar{K} + \Sigma_c(2520) \bar{K}$	seen	—
$\Lambda_c^+ \bar{K}$	not seen	536
$\Lambda_c^+ \bar{K} \pi^+ \pi^-$	not seen	143

 Ω_c^0

$I(J^P) = 0(\frac{1}{2}^+)$

J^P has not been measured; $\frac{1}{2}^+$ is the quark-model prediction.

Mass $m = 2695.2 \pm 1.7$ MeV ($S = 1.3$)
Mean life $\tau = (69 \pm 12) \times 10^{-15}$ s
 $c\tau = 21 \mu\text{m}$

No absolute branching fractions have been measured.

Ω_c^0 DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Sigma^+ K^- K^- \pi^+$	seen	689
$\Xi^0 K^- \pi^+$	seen	901
$\Xi^- K^- \pi^+ \pi^+$	seen	830
$\Omega^- e^+ \nu_e$	seen	829
$\Omega^- \pi^+$	seen	821
$\Omega^- \pi^+ \pi^0$	seen	797
$\Omega^- \pi^- \pi^+ \pi^+$	seen	753

 $\Omega_c(2770)^0$

$I(J^P) = 0(\frac{3}{2}^+)$

J^P has not been measured; $\frac{3}{2}^+$ is the quark-model prediction.

Mass $m = 2765.9 \pm 2.0$ MeV ($S = 1.2$)
 $m_{\Omega_c(2770)^0} - m_{\Omega_c^0} = 70.7^{+0.8}_{-0.9}$ MeV

The $\Omega_c(2770)^0 - \Omega_c^0$ mass difference is too small for any strong decay to occur.

$\Omega_c(2770)^0$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Omega_c^0 \gamma$	presumably 100%	70

NODE=B130215;DESIG=1
DESIG=2;OUR EST
DESIG=3;OUR EST
DESIG=4;OUR EST
DESIG=5

NODE=B147

NODE=B147M+;DTYPE=M
NODE=B147M0;DTYPE=M
NODE=B147W+;DTYPE=G
NODE=B147W0;DTYPE=G

NODE=B147215;DESIG=1;OUR EST;
→ UNCHECKED ←
DESIG=2;OUR EST;→ UNCHECKED ←
DESIG=3;OUR EST;→ UNCHECKED ←
DESIG=4;OUR EST;→ UNCHECKED ←
DESIG=5;OUR EST;→ UNCHECKED ←

NODE=S047

NODE=S047M;DTYPE=M
NODE=S047T;DTYPE=T
NODE=S047CTA;DTYPE=C;OUR EVAL
NODE=S047215;NODE=S047

DESIG=4;OUR EVAL;→ UNCHECKED ←
DESIG=5;OUR EVAL;→ UNCHECKED ←
DESIG=1;OUR EVAL;→ UNCHECKED ←
DESIG=7;OUR EVAL;→ UNCHECKED ←
DESIG=2;OUR EVAL;→ UNCHECKED ←
DESIG=6;OUR EVAL;→ UNCHECKED ←
DESIG=3;OUR EVAL;→ UNCHECKED ←

NODE=S053

NODE=S053M;DTYPE=M
NODE=S053D;DTYPE=D
NODE=S053215;NODE=S053

DESIG=1;OUR EST;→ UNCHECKED ←

NOTES

- [a] See the note on “ Λ_c^+ Branching Fractions” in the Λ_c^+ Particle Listings.
- [b] This branching fraction includes all the decay modes of the final-state resonance.
- [c] An ℓ indicates an e or a μ mode, not a sum over these modes.
- [d] The value is for the sum of the charge states or particle/antiparticle states indicated.
- [e] Assuming isospin conservation, so that the other third is $\Lambda_c^+ \pi^0 \pi^0$.
- [f] A test that the isospin is indeed 0, so that the particle is indeed a Λ_c^+ .
- [g] No absolute branching fractions have been measured. The value here is the branching *ratio* relative to $\Xi^- 2\pi^+$.

LINKAGE=S33

LINKAGE=SAD

LINKAGE=DX

LINKAGE=SG

LINKAGE=LC

LINKAGE=B19

LINKAGE=S45